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IS 878 (2008): Laboratory glassware - Graduated measuring cylinders [CHD 10: Glassware]

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(दूसरा पुनरीक्षण)

Indian Standard

LABORATORY GLASSWARE — GRADUATED MEASURING CYLINDERS

(Second Revision)

ICS 71.040.20

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

September 2008

Price Group 4

Glass, Glassware and Laboratoryware Sectional Committee, CHD 10

NATIONAL FOREWORD

This Indian Standard (Second Revision) which is identical with ISO 4788 : 2005 'Laboratory glassware — Graduated measuring cylinders' issued by the International Organization for Standardization (ISO) was adopted by the Bureau of Indian Standards on the recommendation of the Glass, Glassware and Laboratoryware Sectional Committee and approval of the Chemical Division Council.

This standard was first published in 1956 and then revised in 1975. During this revision, the Committee felt that it would be more convenient to prepare this standard by adoption of ISO 4788 : 2005 on dual number basis.

The text of ISO Standard has been approved as suitable for publication as an Indian Standard without deviations. Certain conventions are, however, not identical to those used in Indian Standards. Attention is particularly drawn to the following:

a) Wherever the words 'International Standard' appear referring to this standard, they should be read as 'Indian Standard'.

b) Comma (,) has been used as a decimal marker, while in Indian Standards, the current practice is to use a point (.) as the decimal marker.

In this adopted standard, reference appears to certain International Standards for which Indian Standards also exist. The corresponding Indian Standards which are to be substituted in their respective places are listed below along with their degree of equivalence for the editions indicated:

International Standard	*Corresponding Indian Standard*	*Degree of Equivalence*
ISO 383 : 1976 Laboratory glassware —Interchangeable conical ground joints	IS 5165 : 1969 Specification for interchangeable conical ground-glass joints	Technically Equivalent
ISO 384 : 1978 Laboratory glassware — Principles of design and construction of volumetric glassware	IS 8729 : 1977 Principles of construction and adjustment of volumetric glassware	do
ISO 719 : 1985 Glass — Hydrolytic resistance of glass grains at 98°C — Method of test and classification	IS 2313 (Part 1/ Sec 1) : 1994 Grading glass alkalinity: Part 1 Hydrolytic resistance, Section 1 Hydrolytic resistance of glass grains at 98°C — Method of test and classification	do
ISO 4794 : 1982 Laboratory glassware — Methods for assessing the chemical resistance of enamels used for colour coding and colour marking	IS 11469 : 1985 Methods for assessing the chemical resistance of enamels used for colour coding and colour marking	do

The technical committee responsible for the preparation of this standard has reviewed the provisions of following International Standard referred in this adopted standard and has decided that it is acceptable for use in conjunction with this standard:

International Standard	*Title*
ISO 4787 : 1984	Laboratory glassware — Volumetric glassware — Methods for use and testing of capacity

BIS Certification Marking clause is given in National Annex A.

(Continued on third cover)

Indian Standard

LABORATORY GLASSWARE — GRADUATED MEASURING CYLINDERS

(Second Revision)

1 Scope

This International Standard specifies dimensions, material and constructional and metrological requirements of graduated measuring cylinders of tall form (Type 1a and Type 1b) and of squat form (Type 2). All types are suitable for general laboratory use.

The specifications in this International Standard are in conformity with the principles of design and construction of volumetric glassware given in ISO 384.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 384:1978, *Laboratory glassware — Principles of design and construction of volumetric glassware*

ISO 719, *Glass — Hydrolytic resistance of glass grains at 98 °C — Method of test and classification*

ISO 4787, *Laboratory glassware — Volumetric glassware — Methods for use and testing of capacity*

3 Basis of adjustment

3.1 Unit of volume

The unit of volume shall be the millilitre (ml), which is equivalent to the cubic centimetre (cm^3).

3.2 Reference temperature

The standard reference temperature, i.e. the temperature at which the cylinder is intended to contain its nominal capacity, shall be 20 °C.

When the cylinder is required for use in a country which has adopted a standard reference temperature of 27 °C; however, this value shall be substituted for 20 °C.

4 Types and classes of accuracy

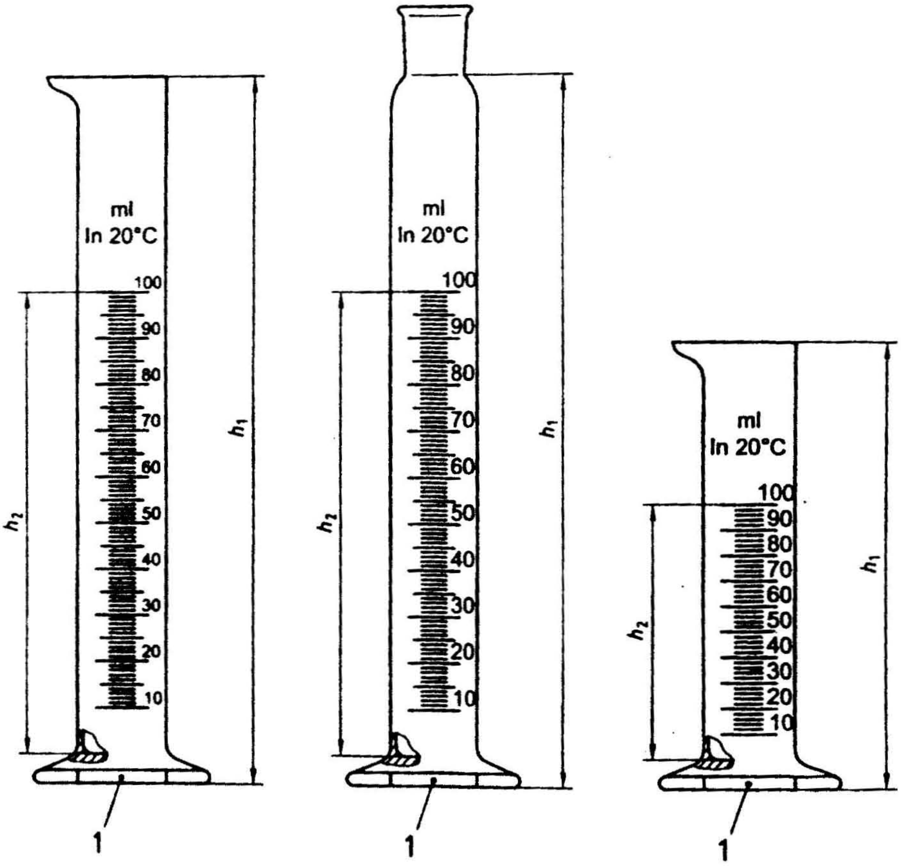
4.1 Types

The following three types of graduated measuring cylinders are specified (see Figure 1):

a) tall form with spouted neck — Type 1a;

b) tall form with stoppered neck — Type 1b;

c) squat form with spouted neck – Type 2.



a) Type 1a, Class B b) Type 1b, Class B c) Type 2

Key

h_1 overall height

h_2 internal height to highest graduation line

1 hexagonal or circular base

Figure 1 — General forms of graduated measuring cylinders

4.2 Classes of accuracy

Two classes of accuracy are specified:

a) Class A for the higher grade (Type 1a and Type 1b only);

b) Class B for the lower grade.

5 Series of capacities and dimensions

The three types of cylinder shall have a series of nominal capacities as shown in Table 1 and Table 2. If cylinders of capacities other than those listed below are required, it is recommended that they conform, as far as possible, to the essential requirements of this International Standard.

Table 1 — Dimensions, subdivisions and limits of error for Type 1 (a and b) cylinders

Nominal capacity ml	Overall height h_1 mm max.	Distance from top of scale to top of cylinder mm min.	Internal height to highest graduation line h_2 mm min.	Sub-divisions ml	Capacity at lowest graduation line ml max.	Max. permissible error ± ml Class A	Class B
5	115	20	55	0,1	1,0	0,05	0,1
10	140	20	65	0,2	1,4	0,1	0,2
25	170	25	85	0,5	2,5	0,25	0,5
50	200	30	110	1	5	0,5	1
100	260	35	145	1	10	0,5	1
250	335	40	200	2	26	1	2
500	390	45	250	5	50	2,5	5
1000	470	50	310	10	100	5	10
2000	570	50	380	20	200	10	20

Table 2 — Dimensions, subdivisions and limits of error for Type 2 cylinders

Nominal capacity ml	Overall height h_1 mm max.	Distance from top of scale to top of cylinder mm min.	Internal height to highest graduation line h_2 mm min.	Sub-divisions ml	Capacity at lowest graduation line ml max.	Max. permissible error [a] ± ml
5	80	25	30	0,5	1	0,2
10	100	30	40	1	2	0,3
25	125	30	65	1	5	0,5
50	150	30	90	1 or 2	10	1
100	170	35	90	2	12	1
250	220	35	125	5	30	2
500	255	50	160	10	60	5
1000	295	50	190	20	100	10
2000	345	50	240	50	200	20

[a] These maximum permissible errors correspond to accuracy Class B in accordance with ISO 384.

6 Definition of capacity

The capacity of a graduated measuring cylinder is defined as the volume of water at 20 °C, expressed in millilitres, contained by the cylinder when filled to the highest graduation line. Where, exceptionally, the reference temperature is 27 °C, this value shall be substituted for 20 °C.

Setting the meniscus shall be performed according to ISO 4787.

The meniscus is set so that the plane of the top edge of the graduation line is horizontally tangential to the lowest point of the meniscus, the line of sight being in the same plane.

7 Maximum permissible error

Maximum permissible errors in capacity shall not exceed the values specified in Table 1 for Type 1 cylinders, and in Table 2 for Type 2 cylinders.

These errors represent the maximum permissible error at any point on the scale, and also the maximum permissible difference between the errors at any two points.

8 Material

The cylinders shall be manufactured from glass of hydrolytic class not lower than HGB3 in accordance with ISO 719. The glass shall be as free as possible from visible defects, and steps shall be taken in manufacture to ensure that it is reasonably free from internal stress.

9 Construction and form

9.1 Wall thickness

The cylinders shall be sufficiently robust in construction to withstand usual laboratory usage, and the wall thickness shall show no gross departure from uniformity.

9.2 Stability

The cylinders shall stand vertically without rocking or spinning when placed on a level surface. They shall not topple when placed empty (without stopper, if provided) on a surface inclined at an angle of 15° to the horizontal.

9.3 Base

The base may be integral, of glass, or it may be detachable, of a suitable plastics or other material, and may be either hexagonal or of other form provided the cylinder satisfies the requirements of 9.2.

9.4 Rim and spout

9.4.1 The rim of the cylinder shall be fire-polished and shall lie in a plane at right angles to the axis of the cylinder.

9.4.2 The spout of a Type 1a spouted cylinder shall be so formed as to enable the contents of the cylinder to be poured out in a narrow stream without spilling or running down the outside of the cylinder.

9.5 Neck and stopper

On a Type 1b stoppered cylinder, the neck shall be ground to a suitable socket size, preferably selected from ISO 383.

A well-fitting stopper of glass or suitable inert plastics material shall be supplied. If individually ground stoppers are supplied, each stopper, and the cylinder it fits, shall be marked with an identification number.

9.6 Dimensions

Type 1 (a and b) cylinders shall comply with the dimensional requirements given in Table 1. In the case of a stoppered cylinder, the "overall height" shall be considered to be the height to the base of the ground neck (see Figure 1, Type 1b).

Type 2 cylinders shall comply with the dimensional requirements given in Table 2.

10 Graduation and figuring

10.1 Graduation

The graduation of all cylinders within this specification shall be in accordance with ISO 384:1978, Clause 9, Graduation pattern II in the case of Class A cylinders and Graduation pattern III in the cases of Class B and Type 2 measuring cylinders.

10.2 Figuring

Figuring shall be in accordance with ISO 384:1978, 10.4.

11 Accuracy testing

Testing of capacity and accuracy shall be performed in accordance with ISO 4787.

12 Marking

12.1 The following shall be permanently marked on each cylinder:

a) number indicating the nominal capacity;

b) the symbol "ml" or "cm^3" to indicate the unit of volume;

The 1 000 ml and 2 000 ml cylinders may, if desired, be inscribed in terms of the litre in place of the millilitre.

c) the inscription "20 °C" to indicate the standard reference temperature (but see 3.2 for a reference temperature of 27 °C);

d) the abbreviation "In" to indicate that the cylinder has been adjusted to contain its indicated capacity;

e) for Type 1a and Type 1b cylinders, the letter "A" or "B" to indicate the class of accuracy and the tolerance in accordance with Table 1;

f) the maker's or vendor's name or mark;

g) in the case of a cylinder with an interchangeable stopper (Type 1b), the size number of the joint shall be marked;

h) the type of glass material, in accordance with Clause 8.

The permanence of marking may be assessed by the test methods specified in ISO 4794.

12.2 An individual identification number shall be permanently marked on each Class A cylinder intended for official verification or certification, or on the stopper and cylinder in all cases where stoppers are individually ground to fit only one cylinder.

13 Visibility of graduation lines, figures and marking

13.1 All figures and marking shall be of such size and form as to be clearly legible under usual conditions of use.

13.2 The graduation lines, the figures and the marking shall be clearly visible and permanent, under usual conditions of use.

Bibliography

[1] ISO 383, *Laboratory glassware — Interchangeable conical ground joints*

[2] ISO 4794, *Laboratory glassware — Methods for assessing the chemical resistance of enamels used for colour coding and colour marking*

NATIONAL ANNEX A

(*National Foreword*)

A-1 BIS CERTIFICATION MARKING

The product may also be marked with the Standard Mark.

A-1.1 The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act*, 1986 and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

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For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

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Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Catalogue' and 'Standards: Monthly Additions'.

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Amendments Issued Since Publication

Amendment No.	Date of Issue	Text Affected

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